On the 8th the sun appeared as usual. They did not notice the red glares until some days after.

Strong's Island is in lat. 5° 20′ N., long. 163° 10′ E. Their 7th is our 6th, one day later than the tremendous display of colours in the Honolulu skies on September 5.

Dr. Pease reports a considerable drift of pumice-stone landed for several months past upon the *west* shore of Kusaie. Many pieces are from twelve to sixteen inches thick, and loaded with barnacles. I have now before me a piece of pumice presented by Dr. Pease, with small barnacles attached. Dr. Pease also reports many large trees landed there of late. They are up to five feet in diameter, with huge buttressing roots, much pumice jammed in the roots, their wood as light as cork. This species of tree is unknown in Micronesia. Are these corky trees, as well as the pumice, part of the wreckage of Krakatoa? Dr. Pease states that this year, as happened once before, the prevailing westerly current has been exchanged for one running easterly. Drift-logs of redwood from California frequently land on Kusaie, as they do here.

On the passage hither between Kusaie and Jaluit Dr. Pease saw large tracts of floating pumice in a comminuted state. The Rev. E. T. Doane of Ponape (lat. 6° 47′ N., long. 158° 20′ E.) writes me that large quantities of pumice are floating around that island. Capt. Holland, of the *Jennie Walker*, states that all the way between Jaluit and Ruk or Hogolen, some 1500 miles, he encountered vast tracts of pumice. Many pieces were as large as hats. He met five or six large trees in the same regions. One with its branches was mistaken for a boat. This association of floating trees with pumice seems very suggestive of Krakatoa, especially as all have been long floating in the sea.

I send herewith a small slab of the pumice from Strong's Island, hoping that you will have it compared with known Krakatoa ejecta.

During the past month of December the sky-glows have doubled in brightness. A like augmentation of brilliancy took place at the same period in 1883, as reported by me in your columns. Permit the suggestion that the winter cold enlarges the concretions of ice around the dust-nuclei in the upper atmosphere, thereby multiplying their reflecting power. I see no reason to believe that any addition has been made to the original diffusion of dust from Krakatoa. The whitish corona which first appeared around the sun in September, 1883, has always and continuously been conspicuous since that time. It is one and the same continuous phenomenon which began here with that tremendous dust-cloud of September 5, 1883.

S. E. Bishop

Hawaiian Government Survey, Honolulu, Dec. 29, 1884

Recent Earthquakes

En relation possible, mais non probable, avec les tremblements de terre d'Espagne j'ai à vous signaler les secousses suivantes observées en Suisse :—

25 décembre, 1884—à Zernetz, Engadine, secousses à 8h. 17′ S., et 11h. S., heure de Berne.

(8h. 17′ heure de Berne correspond à 7h. 32′ heure de Madrid. La première de ces secousses a donc eu lieu 20m. avant la grande secousse de Grenade du 25 déc. à 8h. 52′ soir.)

1 janvier, 1885—2h. matin, légère secousse, signalée à Lausanne par un seul observateur.

21 janvier, 1885—Entre 0h. et 1h. matin, secousse à Ennenda, canton de Glarus.

Dans les Alpes françaises.

le 5 janvier, 1885, à 3h. matin à Chambéry (Savoie).
,, ,, à 5h. 50′ matin à Embrun (Hautes Alpes).

Agréez, Monsieur, l'expression de mes sentiments très distingués.

F. A. Forel

Morges, 24 janvier

On Thursday evening last, at a time which is variously stated from 8.30 p.m. to shortly before 9, a rumbling noise, accompanied by a sensible trembling of the earth, and in some instances by a slight "rocking" of cottages, was heard and felt over several parishes in this neighbourhood. I have already had independent testimony of it from West Buckland, Bradford, Nymhead, and Langford, in a line from north-west to south-east across the upper part of the Vale of Taunton. Some observers state that the noise and motion seemed to come from the north-west. There can be but little doubt but that this was a slight shock of an earthquake. It would be interesting to know whether anything of the same kind had been observed elsewhere at the same time.

W. A. Sanford

Nymhead Court, Wellington, Somerset, January 24

The Lexden Earthquake

The earthquake alleged to have taken place near Colchester on Sunday night, Jan. 18, and mentioned in the "Notes" of Nature last week, on the authority of the *Standard* newspaper, turns out on inquiry to have been reported on very doubtful authority. The place referred to as "Leden" is evidently meant for Lexden, which is really a suburb of Colchester. Immediately after seeing the newspaper paragraph I communicated with some of the residents, asking them to obtain particulars for me, as the occurrence of another shock so near the district which was shaken in April of last year, would have been of considerable interest in connection with the report upon this last earthquake, which I am about to present to the Essex Field Club. It seems, however, according to the results of these inquiries, confirmed by a paragraph in the *Colchester Gazette* of January 21, that the shock was said to have been felt by one person only, the postman, and nobody else in the place heard or felt anything, nor was any crockery shaken or any vibration experienced in any other house. One gentleman, who was out of doors at the time mentioned (midnight), states that he heard a peal of thunder, but felt no shock, and he suggests that this might have awakened the postman, upon whose authority the newspaper paragraph appears to have been founded.

The statement that the shock was felt at Aldeburgh rests also on the authority of one person only, and it shows with what caution such statements should be received in the absence of instrumental records.

R. Meldola

21, John Street, Bedford Row, January 24

Barrenness of the Pampas

Mr. Edwin Clark overlooks, I think, an important factor in the present treeless condition of the Pampas (of the La Plata, so far as my own knowledge extends only), and of the difficulty of establishing trees on those plains. North of Monte Video, for some hundreds of miles, the leaf-eating ant is omnipresent. I have seen streams of them running along the beaten paths to their nests, each ant carrying the yellow petals of some plant similar to the buttercup. When I first noticed, from my horse, this procession of golden leaves, I was greatly astonished. Familiarity, however, soon dispelled this. The *opima spolia* was being carried to their nests and taken under ground, no doubt as a provision for the winter. The ants were about a quarter of an inch in length, and of a beautiful steel-blue colour. Those I picked up for examination demonstrated their powers by shearing off the hard cuticle of my thumb or fore-finger with their mandibles. Subsequently, I made the acquaintance of a gentleman, well known in the Banda Oriental, the owner of the "Estancia Sherenden." He showed me a splendid grove of about two acres of *Eucalypti* of several species—the "blue" and "red" gum chiefly. These he had reared from seed, their enemies being these ants. As soon as the first leaves of his cherished plants appeared, the ants cut them off. He then got a drum of gas-tar sent up from town, and made a circle round each plant. The ants objected to this, and all the trees made a start. For three years in succession he carefully painted the stems with tar, and eventually they got so far away as to be able to supply the wants of their foes and still flourish. When I saw these trees they bore finer foliage than I ever met with in the Australian bush during four years' experience. They were then eight years old. Many were forty feet high, and thirty-six inches round at some three feet from the earth.

I think none of the animals mentioned by Mr. Clarke, *certainly not any of the rodents* in his list, would be likely to touch gum trees, and the repugnance to them of sheep, oxen, and horses in Australia is well known.

Maize grows freely in the Banda, but it grows too fast for these ants to destroy it. The attacks of those from nests within marching distance are powerless on an acre of Indian corn.

When I examined the *Eucalypti* at "Sherenden," many ants were coming down the trees with cuttings of the leaves in their mandibles.

If you will allow me a word of suggestion in addition, I would say to every one who establishes trees on the Pampas

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Seek out the nests of these ants within a quarter of a mile (that would be enough), light a good fire over them in winter, when the inhabitants are at home, and after that there would be no difficulty in gradually covering the ground with plantations. The dried stems of the ubiquitous thistle, cow-dung, corn-cobs, or "paja" grass, would burn out these pests.

ARTHUR NICOLS

Cross-Breeding Potatoes

In the interesting account of the latest successful attempt at raising hybrid potatoes by crossing with different species instead of, as heretofore, by varieties, it is taken for granted the new production will be disease-resisting. Until, however, time has tested the powers of the plant after cultivation, stimulated with all the appliances the potato-growers have at their command, it is rather premature to trust to this. Forty years ago I saw potatoes growing from seed imported direct from South America, and after three years' cultivation they all went with disease in the year 1848. The species I could not tell. The same varieties which go off with disease in this country are never affected in Tasmania, Australia, or New Zealand. At present the newer sorts in cultivation grow so sound and healthy that champions of fine quality over all the east of Scotland are now offering wholesale at three pounds for one halfpenny, and cannot find buyers. The results of the experiments in crossing referred to, while most interesting, will only prove beneficial if a disease-resisting plant is produced having all the table qualities of the old Regent, as well as its great reproductive power, which, with its ability to resist disease, it has now lost.

JAMES MELVIN

43, Drumsheugh Gardens, Edinburgh, January 19

PROTOPLASM[1]

THE fact of a direct continuity between the protoplasmic contents of adjacent cells is an important factor in plant histology. The history of this subject is briefly as follows:—

The individuality of the plant-cells, defended by Schleiden,[2] was first criticised by Hofmeister,[3] and more positively and later by Sachs.[4] For Sachs and also for Strasburger[5] the plant is only one cohering protoplasmic entity. Nägeli[6] has also in a recent work supposed that the protoplasm of each cell is in direct communication with that of the others, by means of delicate protoplasmic filaments.

So far the theoretical side of the question. The first *direct* observation was made in the year 1854 by Theodor Hartig, and not by Sachs as Walter Gardiner[8] states. We find in Hartig's paper the following description of the continuity of sieve-tubes, "Behandelt man in Wasser macerirte Siebröhren mit Schwefelsäure, so erfolgt häufig eine völlige oder theilweise Trennung der beiden Endflächen, in welchem Falle genau zwischen den correspondirenden Ptychodearmen sich Fäden *ausziehen*, die durch Tod dieselbe Färbung und Structur zeigen wie die Ptychodearme selbst. Fig. 18 stellt einen solchen Fall dar."

After Hartig's discovery, confirmed later by Hanstein and Sachs: Mohl, Nägeli, De Bary, Dippel, Wilhelm, Tauczewski, Russow, &c., examined the sieve-tubes and their plasmic connection. For a long time the connection of the sieve-tubes remained the only known fact, until Bornet[1] and E. Perceval Wright[2] in 1878, J. G. Agardh[3] in 1879, and Schmitz[4] in 1883 (the connective filaments were seen), and further, in 1884, Th. Hick[5] and Kolderup-Rosenvinge[6] published some accounts of the communication between adjacent cells in the Florideæ. It seemed to me very probable that in the Cyanophyceæ also communications between the adjacent filament-cells would be found. At least the drawings that Wille[7] gives put one in mind of similar phenomena.

After J. G. Agardh,[8] Tangl,[9] in 1880, succeeded in proving the direct communication in phanerogamous plants between the endosperm cells. In the various papers of Russow,[10] Gardiner,[11] and Hillhouse,[12] these communications are stated in many cases to occur in the bast-parenchyma, the phloem-ray cells of numerous plants, in various pulvini, in the cells of the leaf of Dionæa, in the cells of the stamens of Berberis, in a great number of endosperm cells, and in various cortical tissues.

Finally, Terletzki[13] gave a brief account of the plasmic communication of the parenchyma-cells in the stem of some ferns. I have published also myself[14] a brief account of this interesting object, and described briefly the observations made during the summer of the past year. After Terletzki's paper I was induced to publish my observations, with the full details.[15] The physiological significance of the communication was, in the first instance, not understood; it was believed to be chiefly for the conduction of stimulus in the sensitive organs. But, after numerous observations, there was little doubt that the occurrence of communications between neighbouring protoplasts is not the exclusive privilege of the sensitive organs, and I further claimed the universality of the communication (at least in tissues) in my first paper.[16] This universal occurrence is since confirmed by recent researches.

I have in my second paper[17] given the results of my investigations made on various vegetative tissues. It is superfluous to say anything of the importance of the methods employed in such investigations. For fixing

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[1] "On the Continuity of Protoplasm, and on the Protoplasm of the Intercellular Spaces and the 'Middle Lamellary' Protoplasm, with special reference to the Loranthaceæ and Coniferæ," by Dr Jules Schaarschmidt, *privat-docent* of Cryptogamic Botany and the Anatomy of Plants, Assistant at the Botanic Institute and Gardens, Royal Hungarian University at Kolosvár. Contributed by the author.

[2] Schleiden, "Grundzüge der wissenschaftlichen Botanik," i. anfl., 1842-43

[3] Hofmeister, "Die Lehre von der Pflanzenzelle," Leipzig, 1867.

[4] Sachs, "Vorlesungen über Pflanzenphysiologie," p. 102, Leipzig, 1882.

[5] Strasburger, "Ueber der Bau und das Wachsthum der Zellhäute," p. 246, Jena, 1882.

[6] Nägeli, "Mechanisch-physiologische Theorie der Abstammungslehre," p. 41, München und Leipzig, 1884.

[7] Hartig, "Ueber die Querscheidewände zwischen den einzelnen Gliedern der Siebröhren in *Cucurbita pepo*," *Botanische Zeitung*, xii. col. 43, 1854.

[8] W. Gardiner, "On the Continuity of the Protoplasm through the Walls of Vegetable Cells." Sachs, *Arbeiten des bot. Instituts in Würzburg*, iii. i p. 52, 1884.

[9] Hartig, *l.c.*, col. 43.

[1] Bornet. *Vide* Thuret et Bornet, "Études phycologiques," Paris, 1878.

[2] Wright, "The Formation of the so-called Siphons, and the Development of the Tetraspores in Polysiphonia," *Quart. Journ. Mic. Science*, July 1878; *Transactions* of the Royal Irish Academy, xxvii. 1879.

[3] Agardh, "Florideernes Morphologi," *Stockholm Vet. Akad. Handl.*, xv. p. 140, 1879.

[4] Schmitz, "Untersuchungen über die Befruchtung der Florideen," *Sitz. Ber. d. Rgl. Akad. d. Wissensch.*, p. 219, Berlin, 1883.

[5] Hick, "On Protoplasmic Continuity in the Florideæ," *Journal of Botany*, xxii. p. 33, 1884.

[6] Kolderup-Rosenvinge, "Bidrag-til Polysiphonia's Morfologi," *Saertryk af Botanisk Tidsskrift*, xiv. p. 9, 1884, f. 10-14, 26-28, 72, 75.

[7] Wille, "Ueber die Zellkerne und die Poren der Wände bei den Phycochromaceen," *Ber. d. Deutschen Botan. Gesellsch*, i. vi. p. 245, 1883, and *Bidrag-til Sydamerikas Algflora*, i.-iii., *Bihang till k. Svenska Vet. Akad. Handlingar*, viii. No. 18, p. 6, 1884.

[8] Agardh, *l.c.*

[9] Tangl, "Ueber offene Communication zwischen den Zellen des Endosperms einiger Samen," *Pringsheim Jahrb. f. wissenschaftl. Botanik*, xii. ii. p. 170, 1880.

[10] Russow, "Ueber Tüpfelbildung und Inhalt der Bastparenchym und Baststrahlenzellen der Dikotylen und Gymnospermen," *Sitz. Ber. Dorpater Naturforschergesellsch.*, p. 350, 1882.

[11] Gardiner, "On Open Communication between the cells in the pulvinus of *Mimosa pudica*," *Quart. Journ. Microsc. Sci.*, New Ser., xxii. p. 365, 1882.

"Some Recent Researches on the Continuity of the Protoplasm through the Walls of Vegetable Cells," *Ibid.*, xxiii. p. 301, 1883.

"On the Continuity of Protoplasm through the Walls of Vegetable Cells," *Proceed. Roy. Soc.*, p. 163, 1883.

"On the Continuity of the Protoplasm through the Walls of Vegetable Cells." Sachs, *Arbeiten d. Bot. Instit. Würzburg*, iii. i. p 52, 1884.

[12] Hillhouse, "Einige Beobachtungen über den intercellularen Zusammenhang von Protoplasma," *Botanisches Centralblatt*, xiv. p. 86, 1883.

[13] Terletzki, "Ueber den Zusammenhang des Protoplasmas benachbarter Zellen und über das Vorkommen von Protoplasma in Zwischenzellräumen," *Ber. Deutsch. Botan. Gesellsch.*, ii. iv. p. 169, 1884.

[14] Schaarschmidt, "A protoplastok összeköttetésenek sa sejtközi plasma előfordulásánat nehány esetéről," *Magyar Növénytani Lapok*, viii. No. 84, p. 17, February 1884; see Referate in the *Botanisches Centralblatt*, xviii., No. 18, 1884.

[15] Schaarschmidt, "A protoplastok összeköttetéséről és a sejtközi plasmáról különös tekintettel a Loranthaceákra és Coniferákra," *Ibid.*, No. 87, p. 65, July.

[16] Schaarschmidt, *Botanisches Centralblatt*, xviii. No. 18, 1884.

[17] Schaarschmidt, *Magyar Növénytani Lapok*, viii. p. 77, July 1884.

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